glomerular lesions, all in the healed state. Because the lesions in the heart were rather old and bacteria-free, and because the embolic lesions in the kidney were all completely healed, and there was practically no temperature up to the time that the pneumonia developed, the writer is of the opinion that the presence of pneumococci in the blood was due to a lobar pneumonia developing in a person who was in the bacteria-free stage of subacute bacterial endocarditis.

Summary. Marked anemia; renal phenomena; terminal pneumonia.

THE NOGUCHI LUETIN REACTION IN SYPHILIS.[1]

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Perhaps there is no disease which is characterized by a greater diversity of pathological lesions or is more protean in its manifestations than syphilis. With a clear history of infection and the existence of tell-tale lesions a definite diagnosis may be made without hesitation. A clear history, however, often cannot be elicited, nor are unmistakable lesions always present. The vague symptoms and signs which indicate the insidious development of internal lesions or the early stages of parasyphilitic conditions may suggest syphilis to the trained syphilographer, but in only too many instances a definite diagnosis is attended with insurmountable difficulties for the average practitioner.

In recent years the laboratory has come to the aid of the clinician in diagnosticating these obscure cases. The Wassermann test is a valuable addition to our armamentarium, but one that is infallible by no means. Certain cases of frank syphilis may never give a positive reaction; the sera of those suffering with leprosy, malaria, yaws, etc., may react positively; treatment may render negative the test despite the persistence of active manifestations; and, finally, in view of the technical knowledge required to properly perform the test, the results are not reliable unless the tests have been made by a trained serologist.

The examination of fresh preparations from active lesions may reveal spirochetes that are diagnostic, but this method is applicable only to lesions which by their objective characteristics alone should suggest syphilis to one who knows the disease. Furthermore, various mouth spirochetes may be confused with the specific treponema of syphilis unless the microscopist be an expert.

As neither clinical nor present laboratory methods are devoid of possibilities of error, it is obvious that a means of diagnosis that is specific for syphilis, reasonably delicate, easy of application and interpretation, and innocuous as regards the patient, is still needed. The Noguchi luetin test gives promise of fulfilling this need in certain cases.

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[1] Published with the permission of the Surgeon General, United States Army.

Stimulated by von Pirquet's demonstration of the cutaneous reaction in tuberculosis, numerous investigators attempted to obtain a similar reaction in syphilis by applying extracts of syphilitic tissues to the skin of luetic individuals. Their results were contradictory. Noguchi[2] states that Neisser and Bruck showed that a reaction similar to that obtained with the luetic extracts could be induced, also, with concentrated extract of normal liver. This peculiar susceptibility of the skin of chronic syphilitics to any form of chemical irritation was designated by Neisser as the state of "Umstimmung." Despite his discouraging results, Neisser expressed the hope that the reaction might be improved by employing an extract of the specific organism of syphilis, free from organic constituents. Improvement along these lines was made possible subsequently by the successful cultivation of Treponema pallidum in pure cultures by Noguchi.[3]

PREPARATION OF LUETIN. Noguchi describes the preparation of his luetin as follows: "Pure cultures of several strains of the pallidum are allowed to grow for periods of six, twelve, twenty-four, and fifty days at 37° C., under anaërobic conditions. One set is cultivated in ascitic fluid containing a piece of sterile placenta, and the other in ascitic fluid agar also containing placenta. The lower portion of each solid culture in which a dense growth has occurred is cut out and the tissue removed. The agar columns which contain innumerable spirochetæ are then carefully ground in a sterile mortar. The resulting thick paste is gradually diluted by adding, little by little, the fluid culture which also contains an enormous mass of the pure organisms.

"The dilution is continued until the emulsion becomes perfectly liquid. The preparation is next heated to 60° C. for thirty minutes in a water-bath and then 0.5 per cent. tricresol is added. When examined under the dark-field microscope, numerous dead pallida per field may be seen. Cultures made from this suspension remain sterile and with it no infection can be produced in the testicles of rabbits. The suspension is kept in a refrigerator when not in use.

"In order to ascertain whether the reaction with this suspension might not be due to the introduction of antiseptic culture medium alone, it is necessary to prepare a similar emulsion, with uninoculated media, to be used for control purposes."

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[2] A Cutaneous Reaction in Syphilis, Jour. Exper. Med., 1911, xiv, 557.

[3] Experimental Research in Syphilis, with Special Reference to Spirochæta pallida (Treponema pallidum), Jour. Amer. Med. Assoc., 1912, lviii, 1163.

APPLYING THE TEST. Several months ago the writer received from Dr. Noguchi sufficient luetin to apply the test to a series of cases. All my cases were from the out-patient venereal service of the Post Hospital, Fort Leavenworth, Kansas, and the United States Penitentiary, Leavenworth, Kansas. The test was applied to seventy-five persons, seventy of whom at the time were or had been infected with syphilis, while the remaining five individuals were used as normal controls.

The technique recommended by Noguchi was carefully followed in applying the tests. The sterile vials of luetin and control emulsion were thoroughly shaken and the desired amounts of each were then removed from the containers with sterile pipettes and diluted with an equal amount of sterile salt solution. The arms, at the proposed site of inoculation, were thoroughly cleansed with alcoholic sublimate solution. New graduated tuberculin syringes fitted with very fine needles were used in making the inoculations. The syringes were sterilized by boiling, labelled so that no possibility of using the control syringe for luetin emulsion, or *vice versa*, existed, and separate needles were used for each case. The luetin emulsion (0.07 c.c., accurately measured by the graduations on the syringe) was injected intradermically into the skin of the left arm and the control emulsion, in like manner and quantity, was injected into the skin of the right arm. Care was exercised that the inoculations were made very superficially, so as just to raise the epidermis.

In forty-eight cases the reactions were noted daily for a period of ten days, and, subsequently, at periods of two to four days. In the remaining cases the reactions were examined every three to five days. All cases were under observation for from three to five weeks and a note was made of the changes in the individual reactions at each examination.

CHARACTER OF REACTIONS. It was noted that injections of both luetin and control emulsions produced a circumscribed, elevated, blanched swelling about 4 mm. in diameter, similar in appearance to the lesion produced by the bite of an insect in certain persons.

This local swelling entirely disappears in a half hour or so. In positive cases, after twenty-four hours, there is usually more or less inflammatory reaction at the luetin site, manifested by a distinct, circumscribed, indurated, bright red papule. This papule may be surrounded by a hyperemic areola. A reaction may or may not occur at the site of the control injection. When present the control lesion does not exhibit the same degree of induration as the luetin lesion, but otherwise it may appear identical.

At the end of forty-eight hours the luetin papule has become larger, more indurated, and may be surrounded by an inflammatory areola, from which radiate lines of telangiectasis. This marked inflammatory reaction occurs more commonly between the fourth and seventh days. The control papule, when present, begins to fade in twenty-four hours, and has usually disappeared within three days. In a few cases, however, beside those evidencing the state of "Umstimmung," more or less discoloration remains at the control site for several days. For this reason I believe that one is

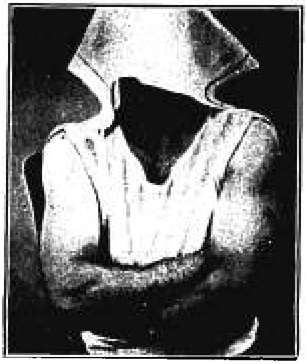

FIG 1.—Became infected in October, 1911. No active lesions at present. Wassermann positive in June, 1912. The left arm shows a distinct pustular luetin reaction with inflammatory areola, while the right arm shows no trace of the control injection. Photograph taken on the tenth day.

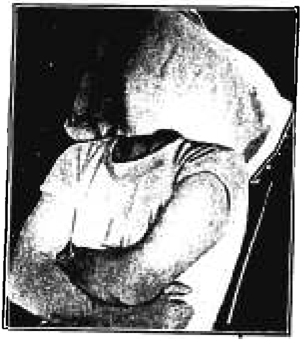

FIG. 2.—Infected in 1908. Treated with mercury and salvarsan. No active manifestations at present. Wassermann negative. Left arm shows a distinct papular luetin reaction. Photograph taken on fifth day.

not justified in making a final reading of the reaction before the seventh day. Control lesions which are not due to "Umstimmung" will have disappeared by that time, while positive luetin reactions will still persist, being, as a rule, more marked than on the second or third days. From the second to the sixth or seventh days the reaction becomes progressively intensive. The centre of the papule becomes boggy and deep purplish red in color, and the lesion may be surrounded by an erythematous blush.

As a rule no systemic reaction accompanies the local lesion, but in a few cases there may be complaint of considerable itching and some soreness of the arm. In only one of my cases, was there an appreciable systemic reaction. This patient reported the second day following inoculation with a temperature of 102° F., and complained of brow-ache, malaise, and "soreness all over." His symptoms disappeared entirely in twenty-four hours without treatment.

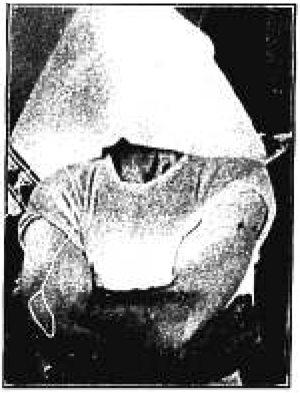

FIG. 3.—Infected in 1909. Treated with mercury for eighteen months during 1909–10. No active lesions at present. Wassermann strongly positive. The left arm shows the appearance of a luetin pustule on the fifth day.

The papular form of reaction begins to fade about the end of the first week, coincidentally with which desquamation of the epidermis over the papule, and in the more intense reactions for an area around it, occurs. The induration remains for several days after the inflammatory signs have disappeared and its subsidence is followed, in turn, by an area of bluish discoloration which persists in many cases for two or three weeks.

The above description is a brief *resume* of the stages observed in the average papular reaction. In certain cases the lesion becomes pustular, usually on the fifth day, followed by rupture of the pustule, as a rule on the seventh day, and crust formation. These pustular reactions seem to bear a rather definite relation to the treatment instituted—a phenomenon that will be discussed later.

A third type of reaction, the torpid form, was observed in two of the cases. In these cases the initial reaction subsided within three or four days, but lighted up again ten days and fifteen days respectively after inoculation and then went through the various stages of the typical luetin papule in one case and pustule in the other.

For purposes of analysis the cases to which the tests were applied may be divided into four series: Series "A" embodies cases exhibiting active secondary manifestations; Series "B" consists of cases showing tertiary lesions; Series "C" covers cases of syphilis with clear histories of infection, but, at the time, latent or cured; Series "D" embraces normal individuals, used as controls. A tabulation of these cases follows:

TABULATION OF LUETIN RESULTS.

SERIES A—SECONDARY SYPHILIS.

CASE 1.—Mucous patches in mouth and general adenopathy. Inunctions of mercury for five months early in 1911. Mercury internally for two months a year ago. Wassermann negative. Positive pustular luetin reaction.

CASE 2.—Mucous patch on tonsil and general adenopathy. Mercury and potassium iodide intermittently for four months in 1912. Wassermann negative. Positive pustular luetin reaction.

CASE 3.—Mucous patches in mouth. Treated with mercury for eleven months following infection. Wassermann positive. Luetin reaction positive papular ("Umstimmung").

CASE 4.—Mucous patches in mouth, and condylomata, general adenopathy, and osteocopic pains. Potassium iodide for three weeks followed by twelve injections of sodium cacodylate. Wassermann positive. Weak papular luetin reaction.

CASE 5.—Cachexia, alopecia, and osteoscopic pains. Salvarsan intravenously in May and November, 1912. Protoiodide by mouth during the past month. Wassermann positive. Luetin reaction negative.

CASE 6.—Mucous patches in mouth. Protoiodide by mouth for six months followed by two intravenous treatments with salvarsan and mercury by mouth during the last five weeks. Wassermann positive. Weak positive papular luetin reaction.

CASE 7.—Mucous patches under tongue. Inunctions of mercury for three weeks in May, 1912, followed by intramuscular injection of salvarsan. Wassermann weakly positive. Positive pustular luetin reaction.

CASE 8.—Mucous patches and infiltration of fauces. Salvarsan intravenously in September, 1912. Wassermann weakly positive. Positive papular luetin reaction appearing on tenth day (torpid form).

CASE 9.—Mucous patches in throat. Salvarsan intravenously in March, 1912, followed inunctions of mercury for four weeks. Wassermann negative. Luetin reaction negative.

CASE 10.—Maculopapular eruption, adenopathy, and sore throat. Intravenous injection of salvarsan three days before tests were applied. Wassermann positive. Positive papular luetin reaction.

CASE 11.—Mucous patches in mouth and occasional osteocopic pains. Mercury by mouth and inunction for two months early in 1911. Salvarsan intravenously in June, 1911. Wassermann negative. Positive pustular luetin reaction.

CASE 12.—Mucous patches in mouth and general adenopathy. Salvarsan intravenously a month ago followed by four intramuscular injections of gray oil. Wassermann negative. Luetin reaction negative.

CASE 13.—General macular eruption, mucous patches, and adenopathy. Two intramuscular injections of gray oil followed by neosalvarsan intravenously forty-eight hours before tests were applied. Wassermann positive. Positive pustular reaction at site of luetin injection appearing fifteen days after inoculation. Papule at site of control ("Umstimmung").

SERIES B—TERTIARY SYPHILIS.

CASE 1.—Gummatous ulcers and cicatrices on leg. Primary sore seven years ago. Clear history of secondaries. Mercury and potassium iodide intermittently for past six years. Five injections of sodium cacodylate recently. Wassermann negative. Positive papular luetin reaction.

CASE 2.—Rupial lesions, alopecia, and general adenopathy. Chancre five years ago. Protoiodide and potassium iodide routinely during past two years. Seven injections of sodium cacodylate recently. Wassermann negative. Weak positive papular luetin reaction.

CASE 3.—Rupial lesions. Not certain of date of infection. Protoiodide by mouth during the past month. Twelve injections of sodium cacodylate. Wassermann negative. Weak positive papular luetin reaction.

CASE 4.—Persistent headache worse at night. Clear history of chancre in 1907, followed by secondaries. Intramuscular injections of mercury and potassium iodide by mouth from January to April, 1908. "Cook's Remedy" during May, 1908. Mercury and potassium iodide during the entire year 1909. Wassermann negative seven consecutive times during the past seven months. Luetin reaction negative.

CASE 5.—Syphilitic orchitis. Denies infection or history of secondaries. Wassermann strongly positive before treatment—now negative. Salvarsan intravenously two weeks before application of tests followed by injection of gray oil. Wassermann negative. Positive pustular luetin reaction.

SERIES C—CONTROLLED SYPHILIS.

CASE 1.—Infected in September, 1911, clear history, no active lesions at present. Salvarsan intramuscularly in February, 1912, preceded and followed by inunctions of mercury. Wassermann strongly positive before treatment and negative at monthly intervals since that time. Positive papular luetin reaction.

CASE 2.—Infected in 1910, clear history, no active lesions at present. Mercury by mouth for two months following appearance of secondaries, salvarsan intramuscularly in 1911, and mixed treatment during the period August to October, 1912. Wassermann negative. Positive papular luetin reaction.

CASE 3.—Infected in 1894. No active lesions at present. Has been treated intermittently with mercury during past eighteen years. Wassermann negative. Strong positive pustular luetin reaction.

CASE 4.—Infected in May, 1911. No symptoms at present. No definite history of treatment can be procured. Wassermann negative. Positive papular luetin reaction.

CASE 5.—Infected a year ago. No active lesions. Mercury by mouth for nine months following infection. Wassermann weakly positive. Positive pustular luetin reaction.

CASE 6.—Infected in October, 1911. No symptoms at present. Protoiodide for nine months followed by potassium iodide for past three months. Wassermann negative. Positive pustular luetin reaction.

CASE 7.—Infected a year ago. No lesions at present. Treated with protoiodide for three months followed by twelve injections of sodium cacodylate. Wassermann strongly positive. Weak positive papular luetin reaction.

CASE 8.—Infected in June, 1909. No lesions at present. Received inunctions of mercury for one month in 1909 followed by a specific mixture (nature not elicited) for a year. No treatment during 1911–12. Wassermann negative. Weak positive papular luetin reaction.

CASE 9.—Infected in 1907. No active lesions at present. Mercury by mouth and inunction for one year. No treatment during past four years. Wassermann weakly positive. Weak positive papule at both luetin and control sites ("Umstimmung").

Case 10.—Infected in 1911. No symptoms at present. Wassermann strongly positive before treatment. Salvarsan intravenously in May, 1911. Wassermann negative. Positive pustular luetin reaction.

Case 11.—Infected in 1904. No active lesions at present. Mercury during the entire year 1905 and potassium iodide during June, 1912. Wassermann positive in April, 1912, now negative. Distinct positive papular luetin reaction.

Case 12.—Infected in 1902. No active lesions now. Wassermann positive on five occasions during the period April to October, 1911. Two intravenous and one intramuscular administrations of salvarsan in March, June, and October, 1911, respectively. Wassermann now weakly positive. Luetin reaction negative.

Case 13.—Infected in June, 1912. No lesions at present. Wassermann positive before treatment. Salvarsan intravenously on November 4 and 23, 1912, followed by four injections of gray oil. Wassermann reaction still positive. Luetin reaction negative.

Case 14.—Infected in October, 1911. No symptoms at present. Wassermann positive before treatment. Inunctions of mercury during November, 1911. Protoiodide by mouth during February, 1912, followed by salvarsan. Wassermann negative. Positive papular luetin reaction.

Case 15.—Infected in December, 1911. No lesions at present. Wassermann weakly positive before treatment. Intramuscular injection of salvarsan, January 28, 1912. Wassermann negative. Weak positive papular luetin reaction.

Case 16.—Infected in July, 1912. No manifestations at present. Inunctions of mercury during the past six months. Wassermann weakly positive. Weak papular luetin reaction.

Case 17.—Infected in October, 1910. No active lesions at present. Wassermann reaction strongly positive on several (five) occasions before and after treatment. Mercury during March, 1911, followed by intravenous treatment with salvarsan. Salvarsan intramuscularly on September 7, 1911. Wassermann now negative. Distinct papular reaction at sites of injection of both luetin and control ("Umstimmung").

Case 18.—Infected in May, 1909. No active manifestations. Mercury for one month in 1909. Patient denies further treatment. Wassermann negative. Weak positive papular luetin reaction. (Constitutional manifestations followed the injection of luetin in this case. Patient complained of "soreness all over," and browache forty-eight hours after inoculation. Temperature, 102° F. All symptoms disappeared, without treatment, in twenty-four hours.)

CASE 19.—Infected in August, 1911. Salvarsan intravenously in September, 1911, December, 1911, and April, 1912. Wassermann negative. Positive pustular luetin reaction (state of "Umstimmung" present for five days).

CASE 20.—Infected for eighteen months. No active lesions. Mercury by mouth for one month during 1912. Wassermann negative. Positive papular luetin reaction ("Umstimmung").

CASE 21.—Infected August 25, 1911. No symptoms at present. Wassermann positive before treatment. Inunctions of mercury for three weeks in September, 1911; salvarsan intravenously in October, 1911; intramuscular injections of mercury in October, 1911. Wassermann negative. Positive pustular luetin reaction.

CASE 22.—Infected in January, 1902. No active manifestations. Wassermann positive before treatment. Mercury for two years, 1901–02. Salvarsan intravenously September 19, 1911. Wassermann negative. Positive papular luetin reaction.

CASE 23.—Infected in July, 1911. No active lesions at present. Mercury for three months in 1911. Wassermann negative. Positive papular luetin reaction.

CASE 24.—Infected in December, 1909. No active lesions now. Wassermann positive early in 1911. Salvarsan intravenously in March, and again in April, 1911. Wassermann negative. Positive papular luetin reaction.

CASE 25.—Infected in September, 1911. No manifestations at present. Wassermann strongly positive before treatment. Salvarsan intramuscularly November 27, 1911. Wassermann weakly positive. Positive pustular luetin reaction.

CASE 26.—Infected in February, 1909. Clear history of typical secondaries. Wassermann positive on five occasions during the period July to October, 1911. Salvarsan intravenously in July, 1911. Wassermann negative. Weak positive papular luetin reaction.

CASE 27.—Infected in 1909. No active lesions at present. Protoiodide by mouth for eighteen months during 1910–11. Wassermann strongly positive. Positive pustular luetin reaction.

CASE 28.—Infected in December, 1911. No active manifestations now. Wassermann negative at monthly intervals for six months following treatment, though positive prior to treatment. Salvarsan intramuscularly February 3, 1912. Patient gained twenty-five pounds after treatment. Wassermann still negative. Luetin reaction negative.

CASE 29.—Infected in December, 1911. No active lesions since treatment. Positive Wassermann before treatment. Salvarsan intramuscularly February 3, 1912. Wassermann negative. Positive papular luetin reaction.

CASE 30.—Infected in February, 1912. No active lesions at present. Wassermann positive before treatment and persisted after first treatment with salvarsan. Salvarsan intravenously in

May and August, 1912. Wassermann negative after second treatment but now positive. Weak positive papular luetin reaction.

CASE 31.—Infected in 1902. No manifestations at present. Four consecutive positive Wassermann tests in the period October, 1911, to February, 1912. Salvarsan intravenously in September, 1911. Wassermann negative. Weak positive papular luetin reaction.

CASE 32.—Infected in November, 1911. No symptoms at present. Wassermann positive before treatment. Salvarsan intravenously February 3, 1912. Wassermann negative. Positive pustular luetin reaction.

CASE 33.—Infected in November, 1911. No lesions now. Inunctions of mercury followed by salvarsan intravenously in March, 1912. Wassermann positive before treatment with salvarsan, now negative. Weak positive papular luetin reaction.

CASE 34.—Infected in October, 1911. No active lesions at present. Wassermann positive in June, 1912. No record of treatment and soldier denies having been treated elsewhere. Wassermann now negative. Positive pustular luetin reaction. (Distinct pustule appeared at site of control injection sixteen days after inoculation. Its development was coincident with the beginning disappearance of the luetin pustule. Delayed "Umstimmung?")

CASE 35.—Infected in 1901. No active manifestations at present. Wassermann strongly positive in April, 1911. Salvarsan intravenously April 18, 1911. Wassermann subsequently and now negative. Weak positive papular luetin reaction.

CASE 36.—Infected in February, 1911. No symptoms at present. Two intravenous and one intramuscular administrations of salvarsan during April and May, 1911. Mercury and potassium iodide during July, 1912. Wassermann negative. Positive papular luetin reaction.

CASE 37.—Infected in July, 1912. Clear history and positive Wassermann before treatment. Inunctions of mercury for one week followed by salvarsan intravenously on September 18, 1912. Wassermann negative. Positive papular luetin reaction.

CASE 38.—Infected in December, 1910. No manifestations at present. Protoiodide by mouth for three months followed by salvarsan intramuscularly. Wassermann weakly positive. Positive papular luetin reaction.

CASE 39.—Infected in 1905. No active lesions. Wassermann positive a year ago. Inunctions of mercury for two months followed by salvarsan intramuscularly on May 22, 1912. Wassermann negative. Weak positive papular luetin reaction.

CASE 40.—Infected in July, 1912. Typical secondaries in September. No lesions at present. Salvarsan intravenously three times during the past three months. Wassermann negative. Positive papular luetin reaction.

CASE 41.—Infected October 4, 1911. Wassermann positive November 5, 1911. Inunctions of mercury from November 3, 1911 to January 26, 1912. Salvarsan intramuscularly November 12, 1911. No lesions at present. Wassermann negative. Positive papular luetin reaction.

CASE 42.—Infected in July, 1909. Wassermann positive in July and November, 1911. Salvarsan intravenously July 2, 1911, followed by inunctions for three months and mercury by mouth for one month. No active manifestations now. Wassermann negative. Weak positive papular luetin reaction.

CASE 43.—Infected in February, 1910. Wassermann strongly positive in June, 1911. Intramuscular injections of mercury May to October, 1910. Salvarsan intravenously June 26, 1911. No lesions now. Wassermann negative. Positive papular luetin reaction.

CASE 44.—Infected in April, 1912. Wassermann weakly positive in May, 1912. Salvarsan intravenously May 23, 1912. No symptoms during past six months. Wassermann negative. Luetin reaction negative.

CASE 45.—Infected in March, 1908. Clear history of secondaries. Treated with mercury from June, 1909, to May, 1910, potassium iodide during July, 1910, salvarsan intravenously March 29, 1911. Wassermann negative. Positive pustular luetin reaction.

CASE 46.—Infected in 1907. Wassermann positive in October, 1912. Treated energetically with mercury for two years, 1907–09. Salvarsan intravenously in October, 1912. Wassermann test has been negative at monthly intervals since treatment with salvarsan. Patient is somewhat anemic, but exhibits no active manifestations. Weak positive papular luetin reaction.

CASE 47.—Infected in 1898. Clear history of secondaries. Wassermann reaction positive before and after treatment in 1911, at Manila, P. I. Salvarsan intravenously, at Manila, P. I., in July, 1911. Wassermann negative at monthly intervals for past four months. No active lesions at present, but patient is anemic and below normal tone. Positive papular luetin reaction.

CASE 48.—Infected in October, 1911. Disease ran a malignant course and was not influenced by mercury. Wassermann strongly positive before treatment with salvarsan. Salvarsan intravenously in March, 1912, followed by inunctions of mercury for three months, and mixed treatment during July, 1912. No active lesions now. Wassermann negative. Strong positive papular luetin reaction.

CASE 49.—Infected in October, 1911. Wassermann positive in November, 1911. Chancre excised, salvarsan administered intramuscularly, followed by inunctions of mercury for two months. Patient gained weight, has remained without symptoms, and Wassermann has been negative at monthly intervals to date. Luetin reaction negative.

Case 50.—Infected in December, 1911. Wassermann positive January 15, 1912. Salvarsan intravenously January 16 and 24, 1912. No active lesions during 1912. Wassermann negative. Positive papular luetin reaction.

Case 51.—Infected in June, 1911. Typical secondaries—mucous patches, maculopapular eruption, alopecia, and adenopathy. Wassermann tests at Fort Leavenworth and Washington laboratories repeatedly negative before treatment. Salvarsan intravenously November 4 and November 27, 1912, followed by two injections of gray oil. No active lesions at present. Wassermann negative. Weak positive papular luetin reaction ("Umstimmung").

Case 52.—Infected in June, 1910. Wassermann positive in July, 1911. Salvarsan intravenously in July, 1911, followed by mixed treatment for one month. Protoiodide by mouth during December, 1911. No active manifestations since that time. Wassermann negative. Luetin reaction negative.

Series D—Control Cases.

Case 1.—Married, non-commissioned officer with healthy children. Denies venereal history. Diphtheria a year ago. Throat culture positive for K-L bacillus. Wassermann at that time negative. No antisyphilitic treatment. Wassermann negative. Luetin test negative.

Case 2.—Robust young soldier. Denies venereal disease. Careful physical examination fails to reveal signs of acquired syphilis or any of the stigmas of congenital lues. These findings concurred in by one of the best syphilographers in the army. Wassermann negative. Typical strong positive papular luetin reaction. Family history shows one grandparent to have had tabes.

Case 3.—Normal young adult male (laboratory assistant). No history of venereal disease. Wassermann and luetin tests negative.

Case 4.—Young soldier. Denies venereal disease. No clinical evidence of congenital or acquired lues. Wassermann negative. Luetin test negative.

Case 5.—Young soldier. Has three typical chancroids which appeared five days after intercourse. History of a single sore, similar to those he now exhibits, three years ago. Treated locally by a druggist and healed in a week or so. No specific treatment. No clinical evidences of syphilis. Wassermann negative. Luetin test negative.

Analysis of Results. By reference to the above summary it will be observed that the luetin test was applied to 13 cases of secondary treated syphilis; 5 cases which exhibited tertiary lesions;

52 cases of syphilis in the stage of latency or cure; and 5 individuals presumably free from syphilis.

The percentage of positive reactions among the treated cases of secondary lues was 77 per cent.; of the tertiary cases, 80 per cent. reacted positively; while among the cases which had reached a stage of latency, 88 per cent. gave a positive reaction. Of the 5 apparently normal individuals used as controls, 1 case developed a typical papular reaction. This occurrence is of considerable moment, as the value of the test hinges largely on its specificity. The case in question was that of a perfectly healthy young soldier who denied absolutely the possibility of syphilis. Careful physical examination failed to demonstrate signs of syphilis, and the Wassermann test was negative on three occasions. The family history revealed the fact that the maternal grandmother suffered with an ailment for several years which, from the recital of symptoms, was probably tabes. It has been demonstrated experimentally that the state of allergy or anaphylaxis (upon which the luetin reaction depends) may be transmitted from a sensitized guinea-pig to her offspring and that this transmission can occur only through the female. This raises the very interesting query as to whether a state of allergy, transmitted from a luetic maternal grandmother, might not explain the positive luetin reaction in the case under discussion. Personally, I am inclined to this belief, for, in view of the mass of evidence in favor of the specificity of the test as the result of observations of numerous investigators covering hundreds of cases, it would be presumptious to contend that the test is not specific because of this one apparently discordant result.

The relative value of the Wassermann and luetin tests is strikingly illustrated in the above series of cases. An opportunity was not offered to apply the luetin test to cases of primary or secondary untreated syphilis, but the work of others seems to show definitely that the reaction rarely occurs in the early stages of the disease. It is in the earlier stages of syphilis that the highest percentage of positive results are obtained with the Wassermann test, while in the later stages the lipotropic substances, upon which a positive reaction depends, are frequently not present in the serum due to fluctuations in the activity of the spirochetæ, induced by treatment or by the production of antibodies which neutralize these lipotropic substances. On the other hand, these fluctuations in the activity of the spirochetæ favor the development of the state of allergy or anaphylaxis, which must be induced before the skin will react to the injection of luetin. In other words, a positive Wassermann test indicates the presence of metabolic substances in the serum, due to present or recent activity of numbers of spirochetæ on the tissues; while a positive luetin reaction is indicative of a state of hypersensitiveness to the specific proteins of the spirochetæ, induced by a period of cessation of the introduction of these proteins prior to the injection of the luetin.

The results obtained practically with the Wassermann and luetin tests in my series of cases supports the foregoing theoretical assumption. The cases which reacted most intensely to the luetin were, as a rule, those in which the Wassermann test was negative, and *vice versa.*

A casual glance at the brief summaries of the cases outlined above will show the value of the luetin test as a diagnostic measure in the tertiary and latent stages of syphilis, but its greatest value, from my limited experience, appears to be as a means of prognosis. In seventy cases of undoubted syphilis, practically all of whom had been treated, either clinical evidence, a positive Wassermann test, or a positive luetin reaction showed that the syphilitic infection had not been entirely suppressed in all but four cases. It seems reasonable to assume that these latter cases (Cases 28, 44, 49, and 52, Series "C") may be registered as cured.

In view of these results, a provocative injection of salvarsan followed by the application of both Wassermann and luetin tests is suggested as a rational means of determining whether treatment has been sufficiently intensive to effect a cure.

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